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IN THE SPECIFICATION:

Please amend the following headings and paragraphs as indicated:

TITLE OF THE INVENTION

A Computer Network for Providing Services and a Method of Providing
Services with a Computer Network

FIELD OF THE INVENTION

~~{0001} The present invention pertains to the field of computer networks. More particularly, this invention relates a computer network for providing services and a method of providing services.~~

BACKGROUND OF THE INVENTION

[0002] A distributed computing environment commonly includes a variety of computing elements that are interconnected by a network. Examples of computing elements include computer systems, server systems, etc., as well as specialized devices having computing resources. The computing elements of a distributed computing environment may be arranged into one or more discrete networks such as local area networks and/or organizational networks that, in turn, may be interconnected through larger networks such as the Internet.

SUMMARY OF THE INVENTION

[0003] ~~The present invention may be embodied~~ specification describes, for example, in a computer network or system for providing services that are controlled by email

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messages. One embodiment ~~of the invention~~ is a network comprising a plurality of computing elements each of which comprises computing resources for supporting one or more services and a redirector, communicatively connected to each of the computing elements, configured to serve as an email proxy for the plurality of computing elements, wherein the services are controlled by email messages routed by the redirector among the plurality of computing elements..

[0004] The present ~~invention~~ specification also encompasses a method of providing services with a computer network that comprises a plurality of computing elements each of which comprise computing resources for supporting one or more services, and a redirector, communicatively connected to each of the computing elements, the method comprising receiving an e-mail message addressed to one of the computing elements for controlling a service; and routing some or all of the e-mail message to a corresponding computing element with the redirector which is configured to function as an e-mail proxy for the computing elements..

[0028] The computing element (20) represents any device or system, ~~known~~ now known or later developed, having computing resources and the appropriate hardware/software for obtaining the email message (40) from the mail server (22) and for loading and executing the service (52). Examples of the computing element (20) include computer systems, handheld devices, input/output devices, peripheral devices including storage devices, printers, scanners, etc., specialized devices such as measurement and/or actuator instruments, wireless devices, appliances, etc., to name just a few examples.

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[0031] In an exemplary embodiment in which the computing element (20) is a device having computing resources, the service (52) may be an application program that performs a diagnostic function on the device (20). For example, the service (52) may obtain diagnostic information, possibly by invoking utilities already present on the computing element (20), and ~~transferring~~ transferring the diagnostic result information back in a response email message.

[0035] Fig. 2 illustrates an exemplary embodiment of the service handler (50) that ~~comprises~~ comprises a mail handler (70) and an HTTP server (72). In this embodiment, device (20) comprises a JAVA virtual machine (91; Fig. 4) that supports the mail handler (70) and the HTTP server (72).

[0038] Fig. 3 illustrates the mail handler (70) in one exemplary embodiment. The mail handler (70) comprises a message receiver (80) that obtains the email message (40) from the mail server (22). In one embodiment, the message receiver (80) is a Post Office Protocol-3 (POP3) email client. In another embodiment, the message receiver (80) is ~~an~~ a Simple Mail Transfer Protocol (SMTP) message receiver. The message receiver (80) passes the email message (40) to a message parser (82). The message parser (82) extracts the access function, command or data input from the message (40) for appropriate action.

[0056] As shown in Fig. 7 and as described above, a computing element (30) outside a discrete network (~~10a~~) (10b) may transmit an email message (40) through the firewall (24) of the network (10b). As described above, this message may contain, for

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example, an access function for a service on the network (10b), a service to be invoked on the network (10b) or a URL where a service can be obtained for use by the network (10b).

[0057] This mail message (40) is received by the network's mail server (22). The mail message (40) may be addressed to a particular service or computing element on the network (10a). However, a redirector (51a) is configured to serve as a proxy for such addresses. Consequently, when an email message (40) is received that is intended to invoke or access a service available on the network (10a), that message (40) is sent to the redirector (51a) as the proxy for computing elements providing a service on the network (10a).

[0059] The redirector (51a) contains a service handler (50a). This service handler (50a) is preferably embodied according to the description of the service handler given above. Upon receipt of an e-mail (40) relating to a service, the service handler (50a) in the redirector (51a) will extract the access function from the message. In other ~~works~~ words, the service handler (50a) will extract from the incoming email message, for example, a command to invoke a service already on the network, a command or data to be submitted to a service on the network, a service to load to the network or a location (URL) where a service can be obtained for use on the network.

[0061] With the redirector (51a) serving as a mail proxy for the computing elements (20a-20z) on the network (10a) that provide services (52a-52z), a larger number of computing elements (20a-20z) and consequent services (52a-52z) can be included in the network (10a) and accessed across the firewall (24) using email messages (e.g., 40).

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[0065] After extraction, the redirector transmits the access function to an appropriate computing element (step 111). If the access function is a command or data ~~in put~~ input for an existing service, the redirector will transmit the access function to the network computing element that supports that function. If the access function is a new service or directions for downloading a new service, the redirector will transmit the access function to a network computing element with available resources.